

Three Seasons of Applying Physical Methods to Control Hydrilla in Mystic Lake on Cape Cod

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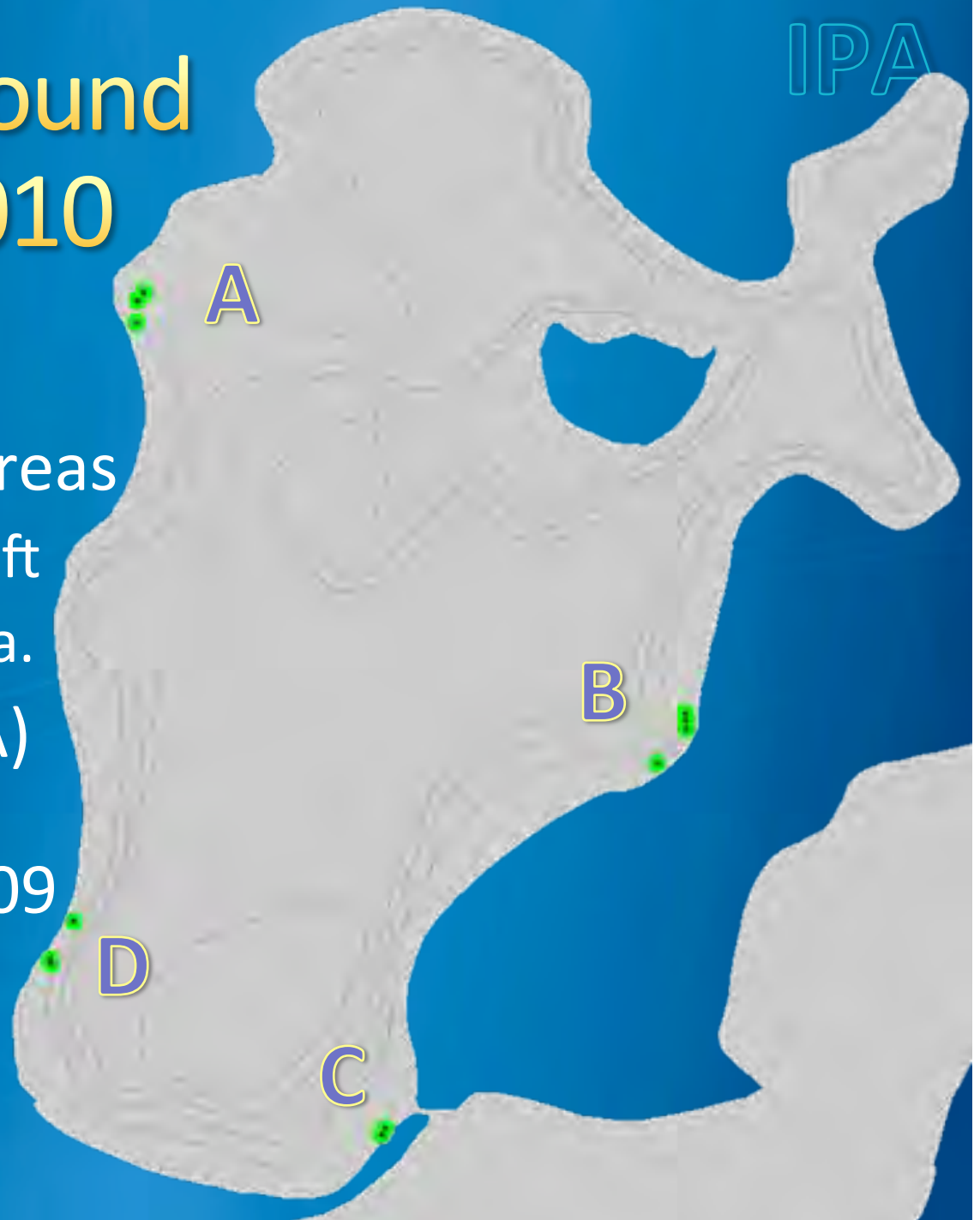
Mystic Lake – Barnstable, MA

- One of three kettle ponds known as the Indian Ponds
- 149 acres, 47 ft max depth, largest water body with Hydrilla in Massachusetts
- Hydrilla discovered 2010
- Three seasons of physical controls with mixed success:
 - Confined raking
 - Benthic barriers
 - Hand pulling
 - Suction harvesting



Hydrilla First Found Late August 2010

- 12 patches found clustered in four areas
 - Largest 30 ft x 40 ft
 - All others <9 ft dia.
- Largest patch (at A) is likely point of introduction in 2009
- All others were likely 2010 growth



Hydrilla Patches Easily Found

- 2-9 ft diameter, dense, bright green patches easily spotted in calm conditions by boat survey
- All in 2-5 ft water depth
- None had topped out at surface



How Did Hydrilla Get Introduced? IPA

- We don't know for sure
- Typical vectors:
 - contaminated boats
 - dumped aquariums
 - water gardens
 - waterfowl
- Suspect waterfowl
- Four widely dispersed areas is somewhat unusual



Sept 2010 – First Control Steps

- All patches raked out after confining with fine mesh seine net
- Areas covered by benthic barriers of AquaScreen, PVC pipe, weighted by sand bags
- 8 IPA volunteers and 3 Mass DCR personnel removed 7 canoe loads of Hydrilla over 3 days



Hydrilla Spread in 2011

IPA

- New patches (purple dots) discovered in 3 of the 4 areas
- Deepest patch in 7 ft of water
- New plants found in all 4 areas
- No new areas found



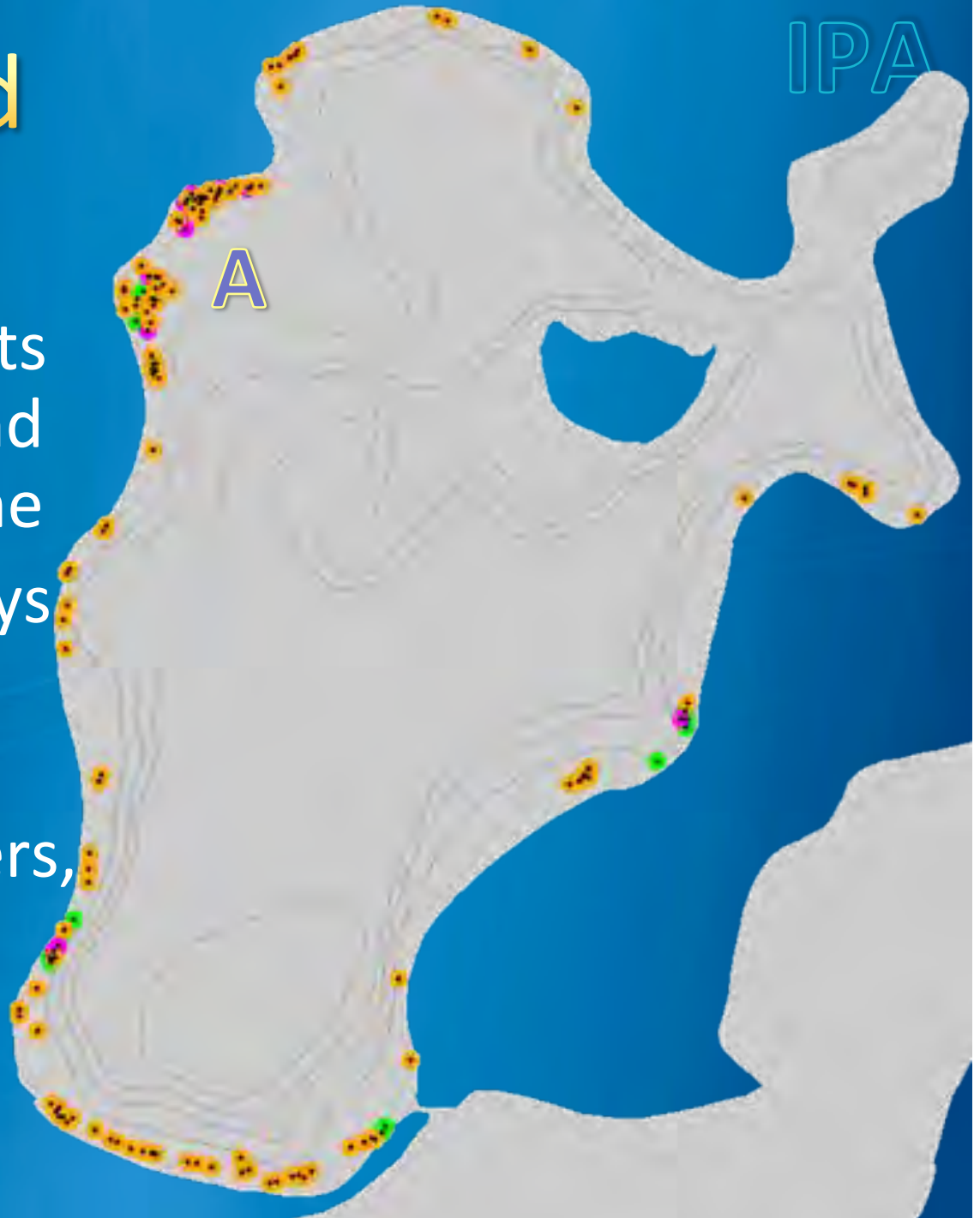
Controls Applied in 2011

- Left existing barriers in place
- Town funded 4 days of hand pulling by 2 SCUBA divers
 - Removed 14 wheel barrow loads of Hydrilla
 - Generated a lot of fragments, some policing around divers by boat with dip net
- IPA volunteers hand pulled all known plants outside Area A
- Some plants remained in Area A



Hydrilla Spread in 2012

- New patches/plants (orange dots) found all around shoreline
- Town funded 9 days of DASH in Area A
- IPA volunteers installed 35 barriers, hand pulled most remaining plants, snorkel surveyed entire shoreline



Why the Big Spread 2011-12?

- 2010-11 spread was minimal except in Area A
- 2011-12 spread around much of lake shoreline
- Possible reasons:
 - Exceptional water clarity in summer 2012 (3-5m Secchi depth vs. 2-3m in summer 2011)
 - Lots of waterfowl feeding, generating fragments
 - Escaping fragments from Aug 2011 SCUBA diver hand pulling, taking root and establishing tubers
 - Winter 2010-11 lake was ice locked vs. open water all winter 2011-12
 - Late forming turions dispersed as growth breaks up (however have never observed any turions)

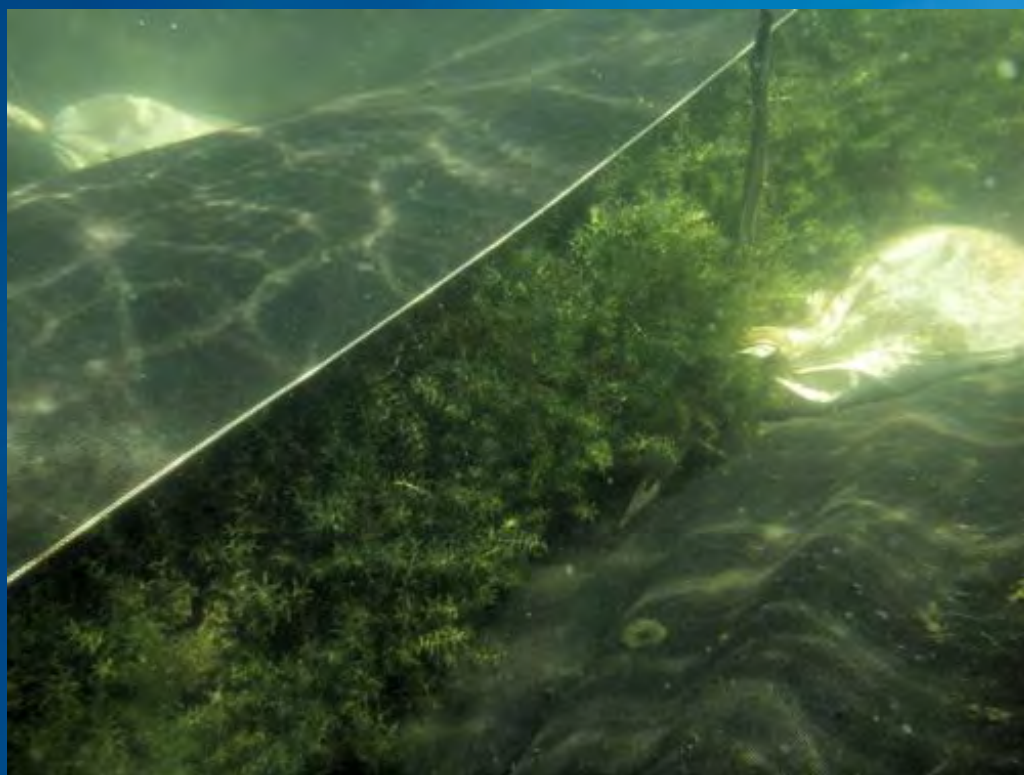
Tools We Use for Hand Pulling

- Plastic pitcher with bottom cut-off
 - Heavy rope duct taped above cut edge
 - Fine mesh laundry bag cinched over rope lip
- Can sweep pitcher to easily capture loose fragments
- Hand fork to loosen plant roots



AquaScreen Benthic Barriers

- 2010 - deployed barriers areas raking out patches
- Left in place to mid 2012



- Little or no regrowth under all, except vigorous regrowth at large original patch

Opaque Benthic Barriers

- 2012 deployed opaque tarp barriers, kills Hydrilla patches in 50-60 days
- Tarps framed with 1 inch PVC pipe
- Tees allow easy joining of panels
- Roll for easy transport/deployment



Diver Assisted Suction Harvesting

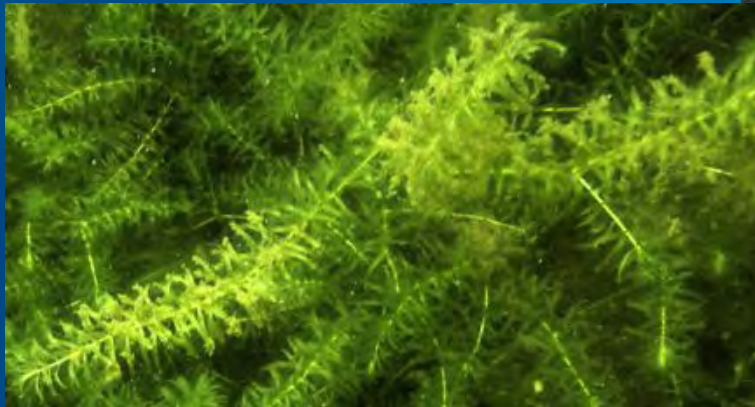
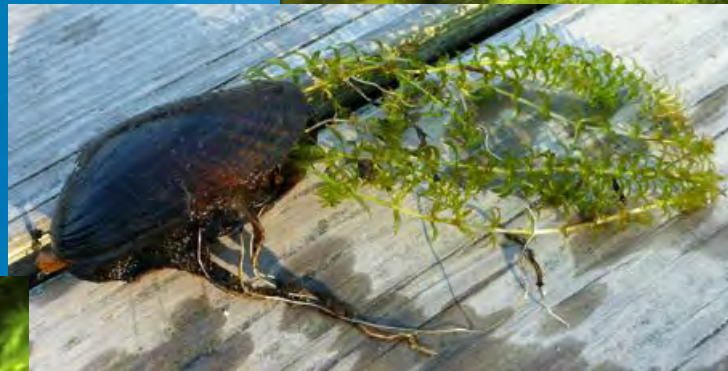
- Spoils discharged on perforated tray
- Water, sediment returned thru duct to bottom
- Plants put in tubs



- Operator tosses back live crayfish, mussels, snails
- Very few escaping plant fragments

Hydrilla Field Observations

- Will root and grow in almost any substrate
- Found in depths 1-8 ft, but typically 2-5 ft
- Often found rooted in dead mussels



- Blue-green algae (possibly Microcoleus) found on it, apparently inhibiting growth

Growth Pattern and Water Clarity IPA

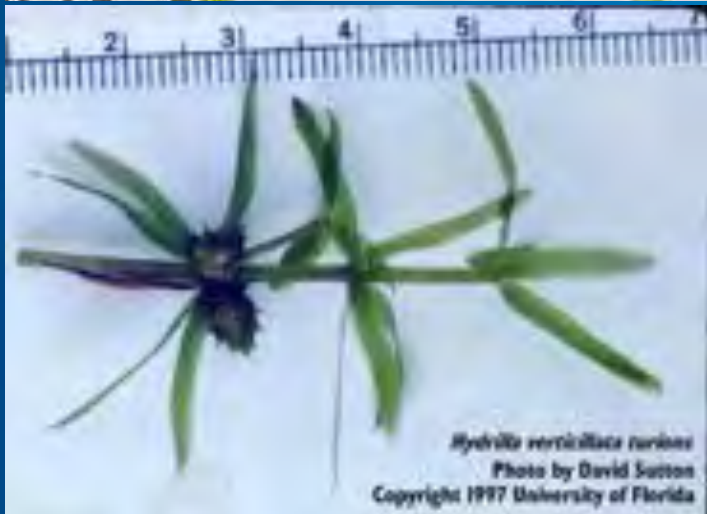
- More light more vigorous horizontal expansion
- 2010 poor water clarity (1-2m Secchi):
 - 6 ft diameter patch, 3 ft tall, in 4 ft of water
 - 9 ft diameter patch, 1 ft tall, in 2 ft of water
- 2012 (3-5m Secchi)
 - Aug 3 - no sign of Hydrilla at a spot
 - Sept 16 – same spot: dense patch 8 ft diam, <6 inches tall, in 2 ft of water, expanding rapidly



Hydrilla Tubers and Turions



- Only sprouted tubers (at left) found June – Aug
- New formed tubers (below) in mid Sept

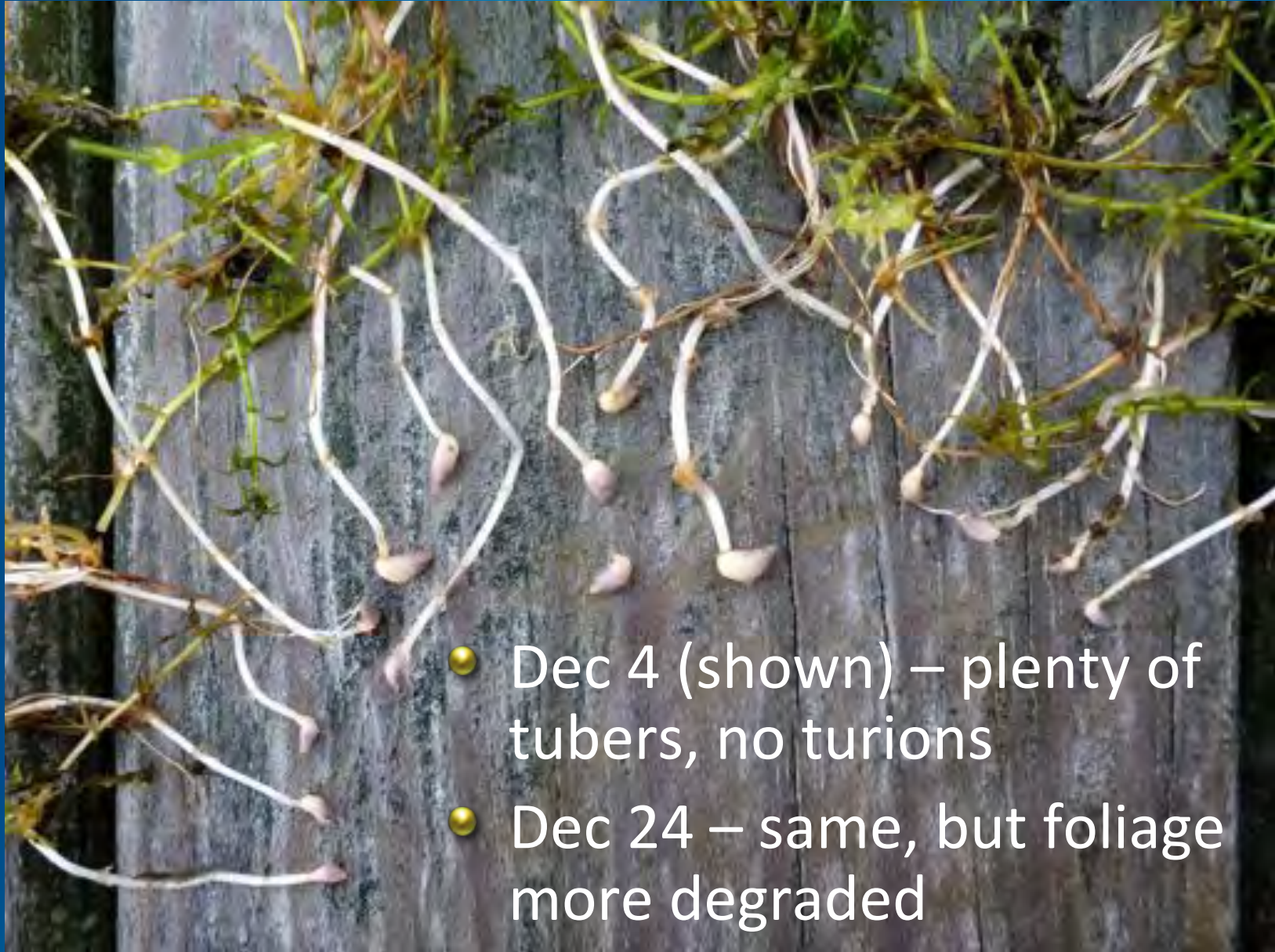


Hydrilla verticillata turion
 Photo by David Sutton
 Copyright 1997 University of Florida



- Never found turions (at left)

Late Season Rake Samples



- Dec 4 (shown) – plenty of tubers, no turions
- Dec 24 – same, but foliage more degraded

Age of Patch Controls Success

- Good chance of elimination if tubers not formed
 - single plant or patch started from fragment and pulled or killed by end of August
- Pioneer 30ft x 40ft patch raked out again in 2012 after sprouting under AquaScreen barrier
 - 4 inch diameter sediment core sample showed 3 sprouted and 2 dormant tubers



After Three Seasons of Physical Controls in Mystic Lake

- Clearly not on a path to eradication
- Have greatly limited Hydrilla growth, it has never topped out
- Have eliminated some patches with no regrowth
- Have likely limited spread, could be much worse
- Plans for 2013
 - Much more Town funded DASH
 - Continue use of opaque barriers
 - Roll back existing barriers, check for sprouting, recover as needed